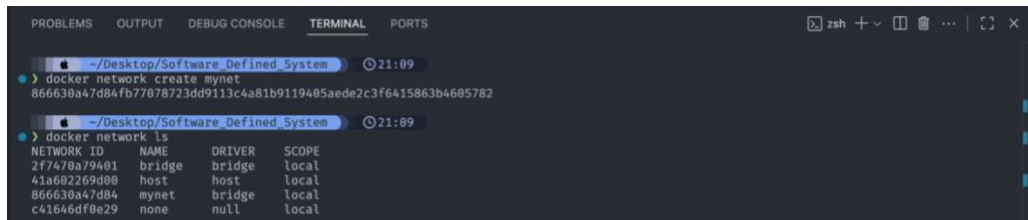


1. ไฟล์ prometheus.yml อยู่ใน zip
2. ภาพ capture หน้าจอ พร้อมคำอธิบายสั้น ๆ ประกอบแต่ละภาพ ของ

2.1.1. คำสั่งที่สร้าง network



```

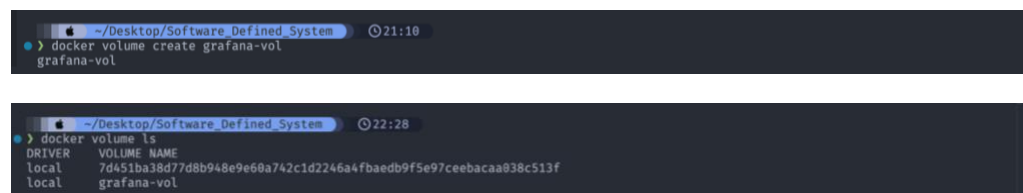
~/Desktop/Software_Defined_System 21:09
> docker network create mynet
866630a47d84fb77078723dd9113c4a81b9119405aede2c3f6415863b4605782

~/Desktop/Software_Defined_System 21:09
> docker network ls

```

NETWORK ID	NAME	DRIVER	SCOPE
2f7470a79401	bridge	bridge	local
41a02269d00	host	host	local
866630a47d84	mynet	bridge	local
c41646df0e29	none	null	local

2.1.2. คำสั่งที่สร้าง persistent storage



```

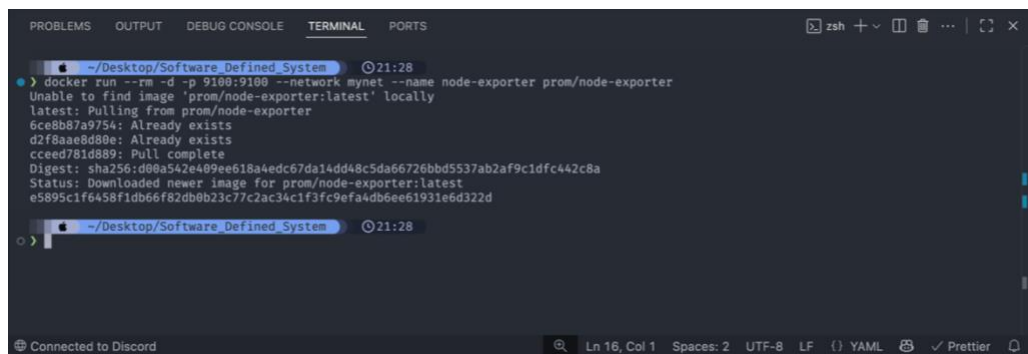
~/Desktop/Software_Defined_System 21:10
> docker volume create grafana-vol
grafana-vol

~/Desktop/Software_Defined_System 22:28
> docker volume ls

```

DRIVER	VOLUME NAME
local	7d451ba38d77d8b948e9e60a742c1d2246a4fbaedb9f5e97ceebacaa038c513f
local	grafana-vol

2.1.2. คำสั่งที่รัน container แต่ละตัว



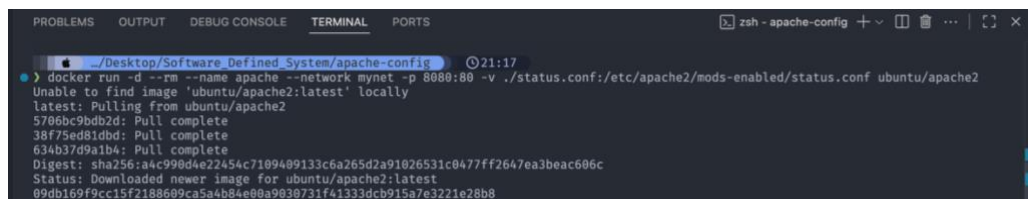
```

~/Desktop/Software_Defined_System 21:28
> docker run --rm -d -p 9100:9100 --network mynet --name node-exporter prom/node-exporter
Unable to find image 'prom/node-exporter:latest' locally
latest: Pulling from prom/node-exporter
6ce8b87a9754: Already exists
d2f8aae8d80e: Already exists
cceed781d889: Pull complete
Digest: sha256:d08a542e409ee618a4edc67da14dd48c5da66726bbd5537ab2af9c1dfc442c8a
Status: Downloaded newer image for prom/node-exporter:latest
e5895c1f6458f1db66f82db6b23c77c2ac34c1f3fc9efa4db6ee61931e6d322d

~/Desktop/Software_Defined_System 21:28
>

```

ภาพที่ 1: Node Exporter



```

~/Desktop/Software_Defined_System/apache-config 21:17
> docker run -d --rm --name apache --network mynet -p 8080:80 -v ./status.conf:/etc/apache2/mods-enabled/status.conf ubuntu/apache2
Unable to find image 'ubuntu/apache2:latest' locally
latest: Pulling from ubuntu/apache2
5796bc9bdb2d: Pull complete
38f75e081dbd: Pull complete
634b37d9a1b4: Pull complete
Digest: sha256:a4c99804e22454c7109409133c6a265d2a91026531c0477ff2647ea3beac606c
Status: Downloaded newer image for ubuntu/apache2:latest
09db169f9cc15f2188609ca5a4b84e00a9030731f41333dcb915a7e3221e28b8

```

ภาพที่ 2: Apache Web Server

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
~/Desktop/Software_Defined_System/apache-config 21:20
> docker run -d --rm --name apache-exporter --network mynet -p 9117:9117 bitnami/apache-exporter --scrape_uri="http://apache:80/server-status/autot"
Unable to find image 'bitnami/apache-exporter:latest' locally
latest: Pulling from bitnami/apache-exporter
1f6b04699206: Pull complete
Digest: sha256:1da525d8ae96589ae7848d8d97f7011bb1206be901ed2fec6b7a67a3e10b982
Status: Downloaded newer image for bitnami/apache-exporter:latest
9d24df92fd8d9b028bb7977e1bb8cc1513d15a635a1ca6961a8a85dc04382cc7

~/Desktop/Software_Defined_System/apache-config 21:21
>

```

ภาพที่ 3: Apache Exporter

```

~/Desktop/Software_Defined_System 21:26
> docker run --rm -d -p 9090:9090 --network mynet --name prometheus -v ~/Desktop/Software_Defined_System/prometheus.yml:/etc/prometheus/prometheus.yml prom/prometheus
Unable to find image 'prom/prometheus:latest' locally
latest: Pulling from prom/prometheus
6ce8b87a9754: Pull complete
d2f8aae8d80e: Pull complete
d932d57a546b: Pull complete
7fb55c4e976b: Pull complete
feadeb862692: Pull complete
76619c1908eb: Pull complete
2dfc70ad9941: Pull complete
fd1d3a5af799: Pull complete
95d87e5ba19a: Pull complete
197a814c6a2c: Pull complete
Digest: sha256:63805ebbd82b3920190daf1cb14a60871b16fd38bed42b857a3182bc621f4996
Status: Downloaded newer image for prom/prometheus:latest
eb3d3e4c29694d5514632a79ab91a85038b211979be5490500ad04ff5967aede

```

ภาพที่ 4: Prometheus

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
~/Desktop/Software_Defined_System 21:38
> docker run --rm -d -p 3000:3000 --network mynet -v grafana-vol:/var/lib/grafana --name grafana grafana/grafana
Unable to find image 'grafana/grafana:latest' locally
latest: Pulling from grafana/grafana
6e174226ea69: Pull complete
3540d00d3a8d: Pull complete
464d91115c2e: Pull complete
4f4fb700ef54: Pull complete
ded2b6dd8adf: Pull complete
9f1d07f40523: Pull complete
c849b4b5b81d: Pull complete
6b1ef42fa3bc: Pull complete
7f46d17c4b0f: Pull complete
476716c10da1: Pull complete
Digest: sha256:a1701c2180249361737a99a01bc770db39381640e4d631825d38ff4535efa47d
Status: Downloaded newer image for grafana/grafana:latest
d87c67540d12c3454b08d80d4faa8eadb080eb1b21e1a3c78e5df11922620dd9

~/Desktop/Software_Defined_System 21:38
>

```

ภาพที่ 5: Grafana

```

~/Desktop/Software_Defined_System 21:31
> docker ps

```

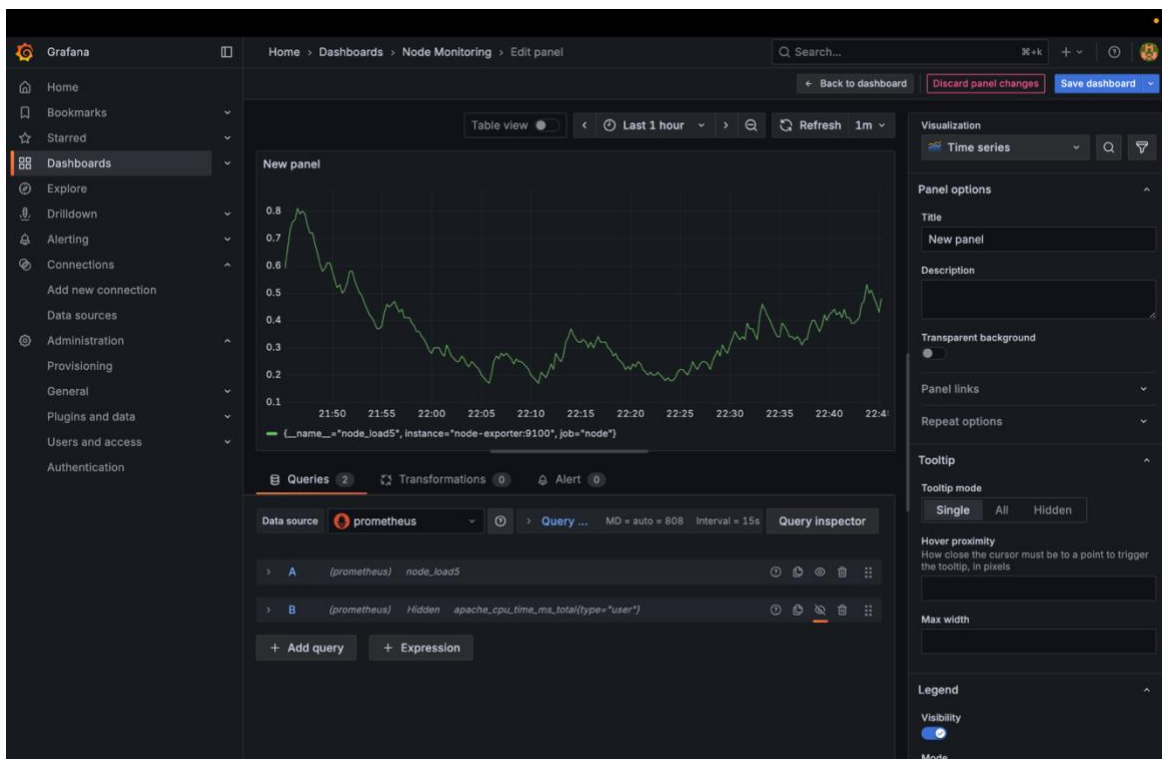
CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
d87c67540d12	grafana/grafana	"/run.sh"	16 seconds ago	Up 15 seconds	0.0.0.0:3000->3000/tcp	grafana
e5895c1f6458	prom/node-exporter	"/bin/node_exporter"	2 minutes ago	Up 2 minutes	0.0.0.0:9100->9100/tcp	node-exporter
eb3d3e4c2969	prom/prometheus	"/bin/prometheus --c..."	4 minutes ago	Up 4 minutes	0.0.0.0:9090->9090/tcp	prometheus
9d24df92fd8d	bitnami/apache-exporter	"apache_exporter --s..."	9 minutes ago	Up 9 minutes	0.0.0.0:9117->9117/tcp	apache-exporter
09db169f9cc1	ubuntu/apache2	"apache2-foreground"	12 minutes ago	Up 12 minutes	0.0.0.0:8888->80/tcp	apache

ผลลัพธ์หลังรัน container ทุกตัว

2.2 หน้าจอ Grafana ที่มีกราฟจาก node-exporter และ apache-exporter พร้อมคำอธิบายสั้น ๆ เกี่ยวกับ metrics ที่เลือกใช้

1) Node Exporter Metric:

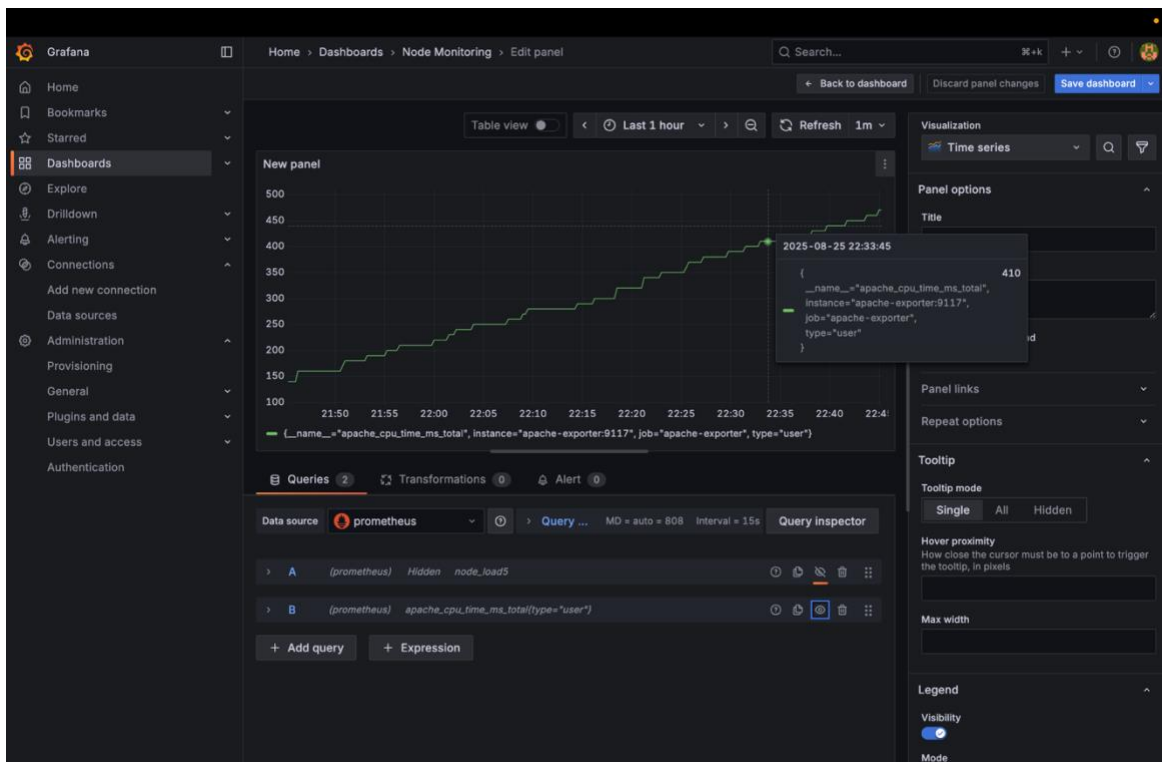
node_load5 - Measures system load average over 5 minutes, indicating overall system workload and resource utilization.



ภาพที่ 1: node_load5

2) Apache Exporter Metric:

`apache_cpu_time_ms_total{type='user'}` - Tracks cumulative CPU time in milliseconds that Apache processes have spent executing in user space, showing Apache's CPU consumption for handling requests and application logic.



ภาพที่ 2: `apache_cpu_time_ms_total{type='user'}`